

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA17 | Offchurch and Cubbington
Data appendix (LQ-001-017)
Land quality

November 2013

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Department
for Transport

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Appendix LQ-001-017

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1 Introduction

1.1.1 The land quality appendices for the Offchurch and Cubbington community forum area (CFA) comprise:

- a summary of engagement undertaken (Section 2);
- detailed risk assessment (Section 3);
- inspection notes and other site data (Section 4);
- geological sites of special scientific interest (SSSI) and local geological sites (Section 5); and
- mining and minerals data (Section 6).

1.1.2 Maps referred to throughout the land quality appendix are contained in the Volume 5 land quality map book.

2 Engagement

- 2.1.1 Table 1 sets out the local authorities and other organisations that have been engaged with during the preparation of the land quality section of the environmental impact assessment (EIA) for the Offchurch and Cubbington study area, the types of information that have been provided to the assessment team and any specific concerns of those engaged with.

Table 1: Engagement on land quality issues undertaken for Offchurch and Cubbington

Local authority or other organisation	Information provided and/or specific concerns
Warwick District Council	Consulted for information on land contamination (2nd April 2013). The Council confirmed that there are no additional potentially contaminated areas which had been overlooked. The Council also confirmed that timber treatment is undertaken at the timber yard in North Cubbington Wood and the site is to be subject to intrusive investigation.
Warwickshire County Council	Meeting held on 13 March 2013. Information on mineral sites (i.e. mineral safeguarding areas within the study area of the Proposed Scheme) received as paper copies in November 2012 and digitally on 12 April 2013.

3 Detailed risk assessment

3.1.1 This appendix presents assessments for the areas assessed as potentially posing a contaminative risk for the Proposed Scheme. For each site the following data is presented:

- baseline risk assessment;
- construction risk assessment;
- post-construction risk assessment; and
- assessment of temporary (construction) and permanent (post-construction) effects.

3.1.2 The sites assessed in this study area are set out in Table 2.

Table 2: Detailed risk assessment for areas assessed as potentially posing a contaminative risk for the Proposed Scheme.

Site reference	Name	Table nos.
17-04	Infilled well	Tables 3-6
17-08	Offchurch Cutting and Disused Railway Cutting historical landfills	Tables 7-10
17-10	Infilled well	Tables 11-14
17-16	Infilled pond	Tables 15-18
17-17	Infilled pond	Tables 19-22
17-31	Burnt Heath Farm	Tables 23-26
17-34	Timber yard	Tables 27-30

3.1.3 Contaminant types included within the risk assessments are based on the Priority Contaminants Report CLR 8¹. Although this report has been withdrawn by the Environment Agency, there has been no subsequent authoritative document to replace it.

3.1.4 The remainder of this appendix presents the risk assessment for the sites set out in Table 2.

¹ DEFRA and Environment Agency (2002), *CLR 8: Potential Contaminants for the Assessment of Land Contamination*.

Table 3: 17-04 Infilled well baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Infilled well Existing contaminants in the soils and groundwater at the source, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Low likelihood	Minor	Low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - pond, reservoir	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas into property	Unlikely	Medium	Low
Main risk	Low risk				

Description

An infilled well is situated 15m west of the area required to construct the Proposed Scheme which will be constructed in cutting at this location. The area of land required to construct the Proposed Scheme nearest to the infilled well will be used for the realignment of Welsh Road. A realistic and worst-case scenario is assumed that the well was manually infilled with waste and a full range of contaminants including leachate and landfill gas are associated with the infilled ground. There are residential properties of Brickyard Cottages adjacent to the infilled well and properties of Springhill Cottages approximately 190m to the north. There is a pond 60m to the west of the site and a reservoir 225m to the north-east of the site. Underlying superficial deposits are classified as a Secondary A aquifer and the bedrock has been classified as a Secondary B aquifer.

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Table 4: 17-04 Infilled well construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction with mitigation
Infilled well Existing contaminants in the soils and groundwater at the source, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Low likelihood	Minor	Low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - pond, reservoir	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas into property	Unlikely	Medium	Low
Main risk	Low risk				

The above risk assessment assumes that the below mitigation measures will be applied during construction:

- although the infilled well should not be disturbed during construction as it is outside of the area required for construction migration may have occurred and should contaminated material/water be encountered it will be remediated or removed;
- it is unlikely that remediation over and above the removal of contaminated material will be required; and
- during construction standard mitigation procedures will be in place in accordance with the Code of Construction Practice (CoCP).

Note

Construction workers have not been included in this assessment.

Table 5: 17-04 Infilled well post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at Post-construction with mitigation
Infilled well Existing contaminants in the soils and groundwater at the source, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Low likelihood	Minor	Low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - pond, reservoir	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas into property	Unlikely	Medium	Low
Main risk	Low risk				

Note

The infilled well will remain post-construction therefore the risks are considered to remain the same as those at baseline.

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Table 6: 17-04 Infilled well significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of adjacent human receptors (residents) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by direct contact and ingestion of contaminants in migrating contaminated water	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low	Low	Low	Negligible	Negligible
Leaching of contaminants from soil to groundwater and vertical and lateral migration in groundwater in Secondary A and Secondary B aquifers	Low	Low	Low	Negligible	Negligible
Lateral migration of contaminants in groundwater and discharge to surface waters as base flow	Very low	Very low	Very low	Negligible	Negligible
Discharge of contaminants to surface water by direct run-off from site	Very low	Very low	Very low	Negligible	Negligible
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Negligible	Negligible
Migration and accumulation of ground-gas into property	Low	Low	Low	Negligible	Negligible
Main risk	Low	Low	Low		
Overall significance				Negligible	Negligible

Table 7: 17-08 Offchurch Cutting and Disused Railway Cutting historical landfills baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Offchurch Cutting and Disused Railway Cutting historical landfills Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas, depending on the waste types and composition accepted.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Unlikely	Minor	Very low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Medium	Moderate/low
	Controlled waters – ponds – issues	Lateral migration of contaminants in groundwater and discharge as base flow	Low likelihood	Minor	Low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas in property	Unlikely	Medium	Low
Main risk	Moderate/low risk				

Description

Offchurch Cutting and Disused Railway Cutting historical landfills (assessed as one site) will be intersected by the Proposed Scheme in cutting. The landfills are in former railway cutting that has been disused since the 1960s and the base of the cutting has been restored as a made path and is now a Greenway used extensively by the public. There is no visual evidence of waste but waste types recorded as accepted at the landfills included inert, industrial and commercial waste. A full range of organic and inorganic contaminants, leachate and ground (landfill) gas are associated with the historical landfills. There are residential property receptors within 10m of the landfills. The nearest surface waters within 250m include numerous ponds and issues. Superficial deposits underlying the landfill are classified as a Secondary A aquifer and bedrock is classified as a Secondary B aquifer.

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Table 8: 17-o8 Offchurch Cutting and Disused Railway Cutting historical landfills construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction with mitigation
Offchurch Cutting and Disused Railway Cutting historical landfills Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas, depending on the waste types and composition accepted.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Unlikely	Minor	Very low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Likely	Medium	Moderate
	Controlled waters – ponds – issues	Lateral migration of contaminants in groundwater and discharge as base flow	Low likelihood	Minor	Low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas in property	Unlikely	Medium	Low
Main risk	Moderate risk				

The above risk assessment assumes that the below mitigation measures will be applied during construction:

- a ground investigation will be required prior to construction to identify whether waste is present within the area likely to be disturbed during construction and if so the depth and nature of the waste;
- it is unlikely that remediation over and above the removal of contaminated material will be required. However gas and leachate control systems will be installed as part of construction if required; and
- during construction standard mitigation procedures will be in place in accordance with the CoCP.

Note

Construction workers have not been included in this assessment. There is considered to be an increased risk to groundwater during construction.

Table 9: 17-08 Offchurch Cutting and Disused Railway Cutting historical landfills post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at Post-construction with mitigation
Offchurch Cutting and Disused Railway Cutting historical landfills Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas, depending on the waste types and composition accepted.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Unlikely	Minor	Very low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Unlikely	Minor	Very low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Unlikely	Medium	Low
	Controlled waters – ponds – issues	Lateral migration of contaminants in groundwater and discharge as base flow	Low likelihood	Minor	Low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas in property	Unlikely	Medium	Low
Main risk	Low risk				

Note

It is assumed that any contaminated material within the area of land required to construct the Proposed Scheme will be removed during construction so there should be no residual contamination. However, some of the landfill will remain undisturbed during construction.

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Table 10: 17-08 Offchurch Cutting and Disused Railway Cutting historical landfills significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of adjacent human receptors (residents) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by direct contact and ingestion of contaminants in migrating contaminated water	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low	Low	Very low	Negligible	Minor beneficial
Leaching of contaminants from soil to groundwater and vertical and lateral migration in groundwater in Secondary A and B Aquifers	Moderate/low	Moderate	Low	Minor adverse	Minor beneficial
Lateral migration of contaminants in groundwater and discharge to surface waters as base flow	Low	Low	Low	Negligible	Negligible
Discharge of contaminants to surface water by direct run-off from site	Very low	Very low	Very low	Negligible	Negligible
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Negligible	Negligible
Migration and accumulation of ground-gas in property	Low	Low	Low	Negligible	Negligible
Main risk	Moderate/low	Moderate	Low		
Overall significance				Negligible to minor adverse	Negligible to minor beneficial

Table 11: 17-10 Infilled well baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Infilled well Existing contaminants in the soils and groundwater, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - ponds - unnamed watercourses	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
Main risk	Low risk				

Description

An infilled well is situated 30m west of the area required for construction where the Proposed Scheme will be constructed in cutting. A realistic and worst-case scenario is assumed that the well was manually infilled with waste and a full range of contaminants including leachate and ground-(landfill) gas are associated with the infilled ground. There are no property receptors within 250m of the well. There are issues and a pond within 250m of the site. Superficial deposits underlying the site are classified as a Secondary A aquifer and the bedrock is classified as a Secondary B aquifer.

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Table 12: 17-10Infilled well construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction with mitigation
Infilled well Existing contaminants in the soils and groundwater, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - ponds -unnamed watercourses	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
Main risk	Low risk				

The above risk assessment assumes that the below mitigation measures will be applied during construction:

- as the infilled well is 30m outside the area of land required to construct the Proposed Scheme, it is unlikely that it will be disturbed during construction. Should contamination have migrated into the area of land required to construct the Proposed Scheme it will be removed;
- it is unlikely that remediation over and above the removal of contaminated material will be required; and
- during construction standard mitigation procedures will be in place in accordance with the CoCP.

Note

Construction workers have not been included in this assessment.

Table 13: 17-10 Infilled well post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at post-construction with mitigation
Infilled well Existing contaminants in the soils and groundwater, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - ponds -unnamed watercourses	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
Main risk	Low risk				

Note

The infilled well will remain post-construction therefore risks are considered to remain the same as those at baseline.

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Table 14: 17-10 Infilled well significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Leaching of contaminants from soil to groundwater and vertical and lateral migration in groundwater in Secondary A and B Aquifers	Low	Low	Low	Negligible	Negligible
Lateral migration of contaminants in groundwater and discharge to surface waters as base flow	Very low	Very low	Very low	Negligible	Negligible
Discharge of contaminants to surface water by direct run-off from site	Very low	Very low	Very low	Negligible	Negligible
Main risk	Low	Low	Low		
Overall significance				Negligible	Negligible

Table 15: 17-16 Infilled pond baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Infilled pond Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - surface watercourses / water bodies	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas into property	Unlikely	Medium	Low
Main risk	Low risk				

Description

An infilled pond is situated within the area of land required to construct the Proposed Scheme which will be on embankment in this location. The land in this area will be used for landscape earthworks. A realistic and worst-case scenario is assumed that the pond was manually infilled with waste and a full range of contaminants including leachate and ground (landfill) gas are associated with the infilled ground. There are residential property receptors approximately 135m to the east of the infilled pond. Superficial deposits underlying the site are classified as a Secondary A aquifer and Bedrock as a Secondary B aquifer.

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Table 16: 17-16 Infilled pond construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction with mitigation
Infilled pond Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - surface watercourses / water bodies	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas into property	Unlikely	Medium	Low
Main risk	Low risk				

The above risk assessment assumes that the below mitigation measures will be applied during construction:

- it is unlikely that remediation over and above the removal of contaminated material will be required; and
- during construction standard mitigation procedures will be in place in accordance with the CoCP.

Note

Construction workers have not been included in this assessment. The land use is likely to involve only minimal ground disturbance so the risks are considered to remain the same as at baseline.

Table 17: 17-16 Infilled pond post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at Post-construction with mitigation
Infilled pond Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - surface watercourses / water bodies	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
		Migration and accumulation of ground-gas into property	Unlikely	Medium	Low
Main risk	Low risk				

Note

It is assumed that any contaminated material will be removed during construction so there should be no residual contamination in the area of land required to construct the Proposed Scheme.

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Table 18: 17-16 Infilled pond significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of adjacent human receptors (residents) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by direct contact and ingestion of contaminants in migrating contaminated water	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating ground-gas and volatile vapours from contaminated soil/water	Low	Low	Low	Negligible	Negligible
Leaching of contaminants from soil to groundwater and vertical and lateral migration in groundwater in Secondary A and Secondary B aquifers	Low	Low	Low	Negligible	Negligible
Lateral migration of contaminants in groundwater and discharge to surface waters as base flow	Very low	Very low	Very low	Negligible	Negligible
Discharge of contaminants to surface water by direct run-off from site	Very low	Very low	Very low	Negligible	Negligible
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Negligible	Negligible
Migration and accumulation of ground-gas into property	Low	Low	Low	Negligible	Negligible
Main risk	Low	Low	Low		
Overall significance				Negligible	Negligible

Table 19: 17-17 Infilled pond baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Infilled pond Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters -River Leam	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
Main risk	Low risk				

Description

An infilled pond is situated within the area of land required to construct the Proposed Scheme, which will be on viaduct in this location. The land will be used as a flood compensation area. A realistic and worst-case scenario is assumed that the ponds were manually infilled with waste and a full range of contaminants including leachate and ground (landfill) gas are associated with the infilled ground. There are residential property receptors within 250m of the ponds. The River Leam lies approximately 100m to the west of the site. Superficial deposits underlying the site are classified as a Secondary A aquifer and Bedrock as a Secondary B aquifer.

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Table 20: 17-17 Infilled pond construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction with mitigation
Infilled pond Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Likely	Minor	Moderate/low
	Controlled waters - River Leam	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
Main risk	Moderate/low risk				

The above risk assessment assumes that the below mitigation measures will be applied during construction:

- the area of the infilled pond will be disturbed during reprofiling of the ground in the flood compensation area and should contaminated material be encountered it will be removed;
- it is unlikely that remediation over and above the removal of contaminated material will be required; and
- during construction standard mitigation procedures will be in place in accordance with the CoCP.

Note

Construction workers have not been included in this assessment. There is considered to be an increased risk to groundwater during construction.

Table 21: 17-17 Infilled pond post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at Post-construction with mitigation
Infilled pond Existing contaminants in the soils and groundwater at the site, potentially including but not limited to a range of inorganic and organic contaminants, leachate and ground (landfill) gas.	Controlled waters - Secondary A superficial aquifer and Secondary B bedrock aquifer	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A superficial and Secondary B bedrock aquifers	Unlikely	Minor	Very low
	Controlled waters - River Leam	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
Main risk	Very low risk				

Note

It is assumed that any contaminated material will have been removed from the area of land required to construct the Proposed Scheme so there should be no residual contamination.

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Table 22: 17-17 Infilled pond significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Leaching of contaminants from soil to groundwater and vertical and lateral migration in groundwater in Secondary A superficial aquifer and Secondary B bedrock aquifer	Low	Moderate/low	Very low	Minor adverse	Minor beneficial
Lateral migration of contaminants in groundwater and discharge to surface waters as base flow	Very low	Very low	Very low	Negligible	Negligible
Discharge of contaminants to surface water by direct run-off from site	Very low	Very low	Very low	Negligible	Negligible
Main risk	Low	Moderate/low	Very low		
Overall significance				Negligible to minor adverse	Negligible to minor beneficial

Table 23: 17-31 Burnt Heath Farm baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Burnt Heath Farm Existing contaminants in the soils at the farm, potentially including but not limited fuels, oils and pesticides.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - ponds	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
Main risk	Low risk				

Description

Burnt Heath Farm is situated 10m east of the area of land required to construct the Proposed Scheme which will be constructed in cutting. Tanks are shown to be present at the site and land closest to the site will be used for the realignment of an existing highway. A realistic and worst-case scenario is assumed that farm vehicles and pesticides have been used on the farm and the tanks were used to store fuel or oil and will have leaked. There are residential property receptors approximately 30m to the north of the farm. There are several ponds and a reservoir within 250m of the site. Superficial deposits are classified as a Secondary A aquifer and bedrock is classified as a Secondary B aquifer.

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Table 24: 17-31 Burnt Heath Farm construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction with mitigation
Burnt Heath Farm Existing contaminants in the soils at the farm, potentially including but not limited fuels, oils and pesticides.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - ponds	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
Main risk	Low risk				

The above risk assessment assumes that the below mitigation measures will be applied during construction:

- the farm is situated outside of the area of land required to construct the Proposed Scheme but should any contamination be present in the area of land required to construct the Proposed Scheme, all contaminated material will be removed; and
- it is unlikely that remediation over and above the removal of contaminated material will be required; and
- during construction standard mitigation procedures will be in place in accordance with the CoCP.

Note

Construction workers have not been included in this assessment.

Table 25: 17-31 Burnt Heath Farm post-Construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at Post-construction with mitigation
Burnt Heath Farm Existing contaminants in the soils at the farm, potentially including but not limited fuels, oils and pesticides.	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary A and Secondary B aquifers	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary A and Secondary B aquifers	Low likelihood	Minor	Low
	Controlled waters - ponds	Lateral migration of contaminants in groundwater and discharge as base flow	Unlikely	Minor	Very low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
Main risk	Low risk				

Note

Burnt Heath Farm will still be present post-construction so risks are considered to remain the same as at baseline.

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Table 26: 17-31 Burnt Heath Farm significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of adjacent human receptors (residents) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by direct contact and ingestion of contaminants in migrating contaminated water	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating volatile vapours from contaminated soil/water	Low	Low	Low	Negligible	Negligible
Leaching of contaminants from soil to groundwater and vertical and lateral migration in groundwater in Secondary A and Secondary B aquifers	Low	Low	Low	Negligible	Negligible
Lateral migration of contaminants in groundwater and discharge to surface waters as base flow	Very low	Very low	Very low	Negligible	Negligible
Discharge of contaminants to surface water by direct run-off from site	Very low	Very low	Very low	Negligible	Negligible
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Negligible	Negligible
Main risk	Low	Low	Low		
Overall significance				Negligible	Negligible

Table 27: 17-34 Timber yard baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Timber yard Existing contaminants in the soils and groundwater at the site, potentially including but not limited to metals, coal tar, solvents and pesticides	Current site users	Direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in contaminated waters	Unlikely	Minor	Very low
		Inhalation of volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary B bedrock aquifer	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary B bedrock aquifer	Low likelihood	Minor	Low
	Controlled waters - drain	Lateral migration of contaminants in groundwater and discharge as base flow	Low likelihood	Minor	Low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
Main risk	Low				

Description

The timber yard is located at the south western corner of North Cubbington Wood adjacent to where the Proposed Scheme will be constructed in retained cutting. A realistic and worst case scenario has been assumed that the timber yard undertakes treatments using a range of chemicals. Potential contaminants include heavy metals, other inorganic contaminants and organic contaminants. There are residential property receptors within 50m of the east of the timber yard. The A surface water drain is adjacent to the east of the site. Superficial deposits underlying the site are classified as unproductive strata and the bedrock is classified as a Secondary B aquifer.

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Table 28: 17-34 Timber yard construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction with mitigation
Timber yard Existing contaminants in the soils and groundwater at the site, potentially including but not limited to metals, coal tar, solvents and pesticides	Current site users	Direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in contaminated waters	Unlikely	Minor	Very low
		Inhalation of volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary B bedrock aquifer	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary B bedrock aquifer	Likely	Minor	Moderate/low
	Controlled waters - drain	Lateral migration of contaminants in groundwater and discharge as base flow	Low likelihood	Minor	Low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
Main risk	Moderate/low				

The above risk assessment assumes that the below mitigation measures will be applied during construction:

- the timber yard is situated outside of the area of land required to construct the Proposed Scheme, the nearest parts of which will be used for highway realignment and for an access route;
- contamination may have migrated into the area of land required to construct the Proposed Scheme, should contamination material be encountered it will be removed
- there may be an increased risk to controlled waters during construction;
- it is unlikely that remediation over and above the removal of contaminated material will be required; and
- during construction standard mitigation procedures will be in place in accordance with the CoCP.

Note

Construction workers have not been included in this assessment.

Table 29: 17-34 Timber yard post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at Post-construction with mitigation
Timber yard Existing contaminants in the soils and groundwater at the site, potentially including but not limited to metals, coal tar, solvents and pesticides	Current site users	Direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in contaminated waters	Unlikely	Minor	Very low
		Inhalation of volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Off-site residents	Direct contact, ingestion and inhalation of contaminants in windblown soil-derived dust	Low likelihood	Minor	Low
		Direct contact and ingestion of contaminants in migrating contaminated waters	Unlikely	Minor	Very low
		Inhalation of migrating volatile vapours from contaminated soil/water	Low likelihood	Minor	Low
	Controlled waters - Secondary B bedrock aquifer	Leaching of contaminants from soil to groundwater and vertical and lateral migration in Secondary B bedrock aquifer	Low likelihood	Minor	Low
	Controlled waters - drain	Lateral migration of contaminants in groundwater and discharge as base flow	Low likelihood	Minor	Low
		Direct run-off from site	Unlikely	Minor	Very low
	Property - buildings, infrastructure, their foundations and services	Direct contact of property with contaminants in soil and surface water/groundwater	Low likelihood	Negligible	Very low
Main risk	Low				

Note

The timber yard will remain post-construction so although any contaminated material encountered within the area of land required to construct the Proposed Scheme will have been removed, the risks are considered to remain the same as at baseline.

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Table 30: 17-34 Timber yard significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust	Low	Low	Low	Negligible	Negligible
Exposure of on-site human receptors by direct contact and ingestion of contaminated waters	Very low	Very low	Very low	Negligible	Negligible
Exposure of on-site humans to contamination by inhalation of volatile vapours from contaminated soil/water	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by direct contact and ingestion of contaminants in migrating contaminated water	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating volatile vapours from contaminated soil/water	Low	Low	Low	Negligible	Negligible
Leaching of contaminants from soil to groundwater and vertical and lateral migration in groundwater in Secondary B aquifer	Low	Moderate/low	Low	Minor adverse	Negligible
Lateral migration of contaminants in groundwater and discharge to surface waters as base flow	Low	Low	Low	Negligible	Negligible
Discharge of contaminants to surface water by direct run-off from site	Very low	Very low	Very low	Negligible	Negligible
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Negligible	Negligible
Main risk	Low	Moderate/low	Low		
Overall significance				Negligible to minor adverse	Negligible

4 Inspections notes and other site data

4.1.1 This appendix presents the following data:

- site inspection notes for those key potentially contaminated sites visited during the study period;
- names of ground investigation or contamination survey reports reviewed during the study period; and
- any other relevant site data.

4.1.2 The remainder of this appendix presents the inspection notes and other data for the sites.

Table 31: Site inspection notes

Walkover location Offchurch Cutting and Disused Railway Cutting historical landfills	Details
Date of walkover	22 October 2012
Location of area	NGR – 436930:265819
Access to area	The historical landfill area is a public right of way – Offchurch Greenway
Site description	This area of land is still largely set in the old railway cutting. The exception being an area of made ground under the road junction approximately 440m south west of the centreline of the Proposed Scheme. Here the old railway bridge/tunnel has been infilled.
Topography and surroundings – elevation in relation to surroundings, hummocks, breaks of slope etc.	Apart from the made ground at the road junction there is no obvious evidence of infilling. The cutting is still in existence below the level of the surrounding topography. Should waste exist at the base of the cutting under the footpath it is unlikely to be more than a few meters deep.
Neighbouring site use (in particular note any potentially contaminative activities or sensitive receptors)	The surrounding land use is largely agricultural with some residential properties close to the road junction.
Site buildings – extent, size, type and usage. Boiler rooms, electrical switchgear	No buildings on site.
Ground surfacing – type and condition	The ground surface is a made path.
Vegetation – evidence of distress, unusual growth or invasive species such as Japanese Knotweed	Vegetation lines the slopes of the cutting, no evidence of distress or unusual growth.
Services – evidence of buried services	None observed.

5 Geological SSSI and local geological sites

5.1.1 This appendix presents the following data:

- citation data for geological sites of special scientific interest (SSSI);
- citation data for local geological sites (LGS), formerly called regionally important geological sites (RIGS); and
- any other relevant site data.

5.1.2 There are no geological SSSI or local geological sites in the Offchurch and Cubbington study area.

6 Mining and minerals data

6.1.1 This appendix presents the following data relating to mining and minerals information:

- details of planning data for minerals sites;
- lists of marl pits in each study area; and
- data from The Coal Authority.

6.1.2 There are no relevant mining sites or additional mineral data for the Offchurch and Cubbington study area.